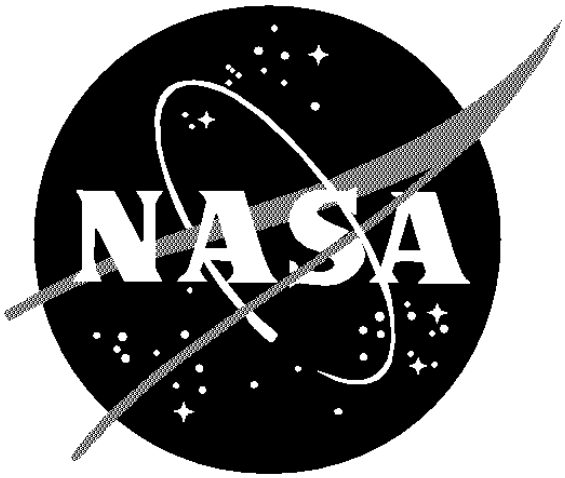

National Aeronautics and Space Administration

October 11, 2002

NRA-02-OES-06

RESEARCH ANNOUNCEMENT

INVESTIGATIONS THAT CONTRIBUTE TO THE NASA EARTH SCIENCE ENTERPRISE'S MULTIDISCIPLINARY RESEARCH IN CLIMATE, CHEMISTRY, AND GLOBAL MODELING

Notices of Intent Due November 12, 2002
Proposals Due December 12, 2002

OMB Approval No. 2700-0087

INVESTIGATIONS THAT CONTRIBUTE TO THE NASA EARTH SCIENCE ENTERPRISE'S MULTIDISCIPLINARY RESEARCH IN CLIMATE, CHEMISTRY, AND GLOBAL MODELING

NASA Research Announcement
Soliciting Research Proposals
For
Period Ending
December 12, 2002

NRA 02-OES-06
Issued October 11, 2002

Office of Earth Science
National Aeronautics and Space Administration
Washington, DC 20546

NASA RESEARCH ANNOUNCEMENT

INVESTIGATIONS THAT CONTRIBUTE TO THE NASA EARTH SCIENCE ENTERPRISE'S MULTIDISCIPLINARY RESEARCH IN CLIMATE, CHEMISTRY, AND GLOBAL MODELING

The NASA's vision is
To improve life here,
To extend life to there,
To find life beyond.

The NASA mission is
To understand and protect our home planet
To explore the universe and search for life
To inspire the next generation of explorers
…as only NASA can.

The NASA Earth Science Enterprise:

NASA's Earth Science Enterprise (ESE) supports the Agency mission through scientific research that increases our understanding of and our capability to model and predict the Earth system, and through applications that expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology.

The mission of NASA's Earth Science Enterprise (ESE) is to develop a scientific understanding of the Earth system and its response to natural and human-induced changes, thereby improving the predictive capabilities for climate, weather, and natural hazards. Through its science research programs, the ESE aims to acquire a deeper understanding of the components of the Earth system and their interactions. These interactions occur on a continuum of spatial and temporal scales ranging from local and regional to global scales and from short-term weather to long-term climate scales. The Enterprise also seeks to provide accurate assessments of changes in the chemical composition and physical state of the atmosphere; in the extent and health of the world's forest, grassland, and agricultural resources; and in geologic phenomena that lead to natural hazards.

The key research topics studied by NASA's Earth Science Enterprise fall largely into five categories: variability, forcing, response, consequences and prediction. This conceptual approach applies to all research areas of NASA's Earth Science program, although it is particularly relevant to the problem of climate change. The NASA Earth Science Enterprise scientific strategy to address this complex problem can be laid out in five fundamental questions, each raising a wide range of cross-disciplinary science problems [http://www.earth.nasa.gov/visions/index.html].

- *1) How is the global Earth system changing (Variability)?*
- *2) What are the primary forcings of the Earth system (Forcing)?*
- *3) How does the Earth system respond to natural and human-induced changes (Response)?*
- *4) What are the consequences of change in the Earth system for human civilization (Consequences)?*
- *5) How well can we predict future changes in the Earth (Prediction)?*

While these five questions define a logical progression in the study of global change, each one covers a range of topics too broad to serve as a simple guide for program implementation. For this purpose, more specific research questions need to be formulated and prioritized.

The strength of NASA's Earth science program is derived from the synergy between different classes of observations, basic research, modeling, and data analysis, as well as field and laboratory studies. In particular, NASA's Earth Science research strategy recognizes the need for close linkage between the observation programs and the data analysis and predictive Earth system modeling programs at all relevant spatial and temporal scales. Developing the means for full utilization of global observational data (e.g. through systematic data assimilation) and for analysis of discrepancies between observed and modeled fields is considered an essential component of the program. In this respect, NASA's research strategy fully subscribes to the recommendation of the National Research Council's Board on Atmospheric Sciences and Climate (NRC, 1998) to: "Apply the discipline of forecasting in order to advance knowledge, capabilities for prediction, and service to society". The synergy between global Earth observation, analysis, and modeling is perceived as an essential means to answer these scientific questions. One of NASA's most important responsibilities is to support an integrated United States government research effort to improve knowledge of the Earth System and to provide products that support economic and policy decision-making.

The intellectual capital for both the planning and exploitation of Earth system observations is vested in a robust research and analysis program. Research and analysis are the conceptual source of Earth system science questions and the strategies to address them. The research program supports the early development of innovative observing techniques (including both instruments and the linkage of instruments with platforms) and processing algorithms, organizes field tests, and generally charts the path for scientific and engineering developments that enable future advances. It assures the linkage between global satellite observations, *in situ* process-oriented observations, and the computational models used to provide both a framework for interpretation of observations and a tool for prediction. It helps assure the development of consistent, integrated, and calibrated data sets, especially those that involve multiple instruments, observational platforms, and observing techniques. Altogether, the research and analysis program brings fundamental research to bear on key Earth Science issues, and lays the interdisciplinary groundwork for linking these research efforts.

The research programs of NASA's in Earth System Enterprise constitute an important part of our Nation's investment in research on global change, including the evolution of the Earth's climate. NASA has been one of the major contributors to the US Global Change Research Program [http://www.usgcrp.gov] through its activities in global observations, process observations, and computational modeling. These elements of the ESE research program also will be important elements of the Climate Change Research Initiative (CCRI) announced by the United States in 2001 [http://www.usgcrp.gov/usgcrp/Library/CCRIreport-aug2001/default.htm . In particular, the observational data sets produced by ESE and the computational models will support both the assessments for policymakers and provide input into decision-support systems, which are to be enhanced through the CCRI.

This NASA Research Announcement (NRA):

This NRA identifies multidisciplinary research related to four of the questions above: Variability, Forcing, Response and Prediction.

NASA disciplines included in this NRA are the Radiation Sciences program (RSP), the Global Modeling and Analysis Program (GMAP), the Tropospheric Chemistry Program (TCP) and cross-cutting Interdisciplinary Science (IDS) research.

Emphases among the NASA Research Strategy questions for this solicitation are described below. NASA supports the proposed National Aerosol-Climate Interactions Program (NACIP) [http://www-c4.ucsd.edu/NACIP] concept and will establish NASA participation through this NRA. The NASA effort will be coordinated with complementary research efforts at NOAA, NSF (Climate and Atmospheric Chemistry) , DOE and EPA. Program Managers from these agencies may participate in evaluation of proposals submitted to this NRA and they may consider separate funding for proposals that support their respective agency objectives.

The research solicited in this NRA is designed to address several of the key issues to be included as part of the US Government's Climate Change Research Initiative. The CCRI, based in large part on the government's response to the report "*Climate Change Science: An Analysis of Some Key Questions*" issued by the National Academy of Science in June, 2001 [http://books.nap.edu/books/0309075742/html/], made specific reference to the need to improve our understanding of the direct and indirect effects of aerosols as well as changes in concentrations of other radiatively active gases, including tropospheric ozone. Particular focus on atmospheric aerosols was also called for by the government in the report "U.S. Climate Change Strategy: A New Approach" issued on February, 14, 2002 [http://www.usgcrp.gov/usgcrp/Library/gcinitiative2002/gccstorybook.htm], which included as a specific priority for FY2003 "Developing Reliable Representation of the Global and Regional Climatic Forcing by Atmospheric Aerosols."

(Variability) What are the effects of clouds and surface hydrologic processes on Earth's climate?

Improved knowledge and understanding of tropospheric clouds and mechanisms that contribute to their evolution are critical to formulation and verification of methods to realistically capture cycling of water in regional and large- scale climate models. Proposals are solicited for instrument development/improvement, and modeling and analysis of data from past field missions [e.g. http://asd-www.larc.nasa.gov/fire/] which focus on understanding of cloud systems and their impact on weather and climate. Modeling and analysis of CRYSTAL-FACE data will not be considered responsive to this NRA, as the data will not be available for public release until well beyond the due date for this NRA. A subsequent NRA will be issued for modeling and analysis of CRYSTAL-FACE data after public release of the data.

Proposals that develop and utilize multi-dimensional radiative transfer algorithms to model and analyze remote sensing of clouds are of interest. In particular, proposals that build upon the Inter-comparison of 3D Radiation Codes (I3RC) [http://climate.gsfc.nasa.gov/I3RC/] research focus will be responsive. Successful proposals will include ground-based, *in situ* and/or satellite remote sensing data to improve understanding of these cloud systems and their impact on radiative forcing and climate. Recent observations from NASA Tropical Rainfall Measuring Mission (TRMM) suggest anthropogenic influence on cloudiness and precipitation through modification of the nucleation process. Studies that integrate cloud modeling with space-based, suborbital and in-situ observations to further test and evaluate this hypothesis are encouraged.

(Forcing) What are the trends in atmospheric constituents and solar radiation are driving global climate?

One of the major uncertainties that limits the confidence scientists place in the results of climate models is the ability of models to accurately represent the source, composition, size, shape and distribution of natural and anthropogenic aerosols and their impact on the radiation budget of the surface-atmosphere system.

Proposals that build upon the NASA/Global Energy and Water Cycle Experiment (GEWEX) Global Aerosol Climatology Project (GACP) [http://gacp.giss.nasa.gov], and include aspects of aerosol research that encompass aerosol-chemistry and aerosol-chemistry-climate coupling are of interest. The large uncertainty that aerosols introduce in our understanding of climate change is illustrated by the Intergovernmental Panel on Climate Change study published in Climate Change 2001 (see IPCC, 2001 , http://www.ipcc.ch/), in which two chapters: 5. Aerosols, their Direct and Indirect Effects; and 6. Radiative Forcing and Climate Change, highlight the advances and the challenges in this area of research. Proposals are solicited for research that builds on the results of the GACP, supports the strategy described within the NACIP and responds to issues identified within the IPCC 2001 as well as the National Academy of Sciences reports cited earlier.

An issue that merits immediate attention is remote sensing of Black Carbon (BC) in the atmosphere from satellite platforms. In order to retrieve such information from satellite observations, in situ data must be gathered to characterize BC sufficiently to support development of reliable sensor retrieval algorithms. In situ data gathered coincident with satellite remote sensing observations will support determination of the BC distribution in the atmosphere on a global scale.

Specific questions for this NRA in support of satellite instrument development and observations include:

- What are the mass, number, size, chemical composition and optical properties of black carbon containing aerosols in the atmosphere?
- What are the sources of black carbon aerosols, and what fraction of the sources are anthropogenic?

- Is the black carbon internally or externally mixed with other aerosols, and how much does that mixing alter the single scattering albedo?
- Is the black carbon removed by deep convection, or transported into the upper atmosphere where it may have a long lifetime?

Answers to these questions will provide optical properties required in the development of radiance algorithms, initiation of models describing the global distributions for comparison with satellite data, and local to regional variations necessary to characterize satellite observations over targeted locations, e.g. urban environments, rain forests.

To the extent that suborbital platforms are required to address the questions above, the NASA suborbital platforms including current airborne, balloon, and UAVS will be available for test flight of new or improved instruments. Proposals requesting use of this platform should include the type and number of flight hours required and costs for platform integration.. Measurements required to address the questions above include those specified as well as tracers that will allow characterization of the airmass sampled.

Trace gases, in particular CO, CH_4 and CO_2, contribute to the uncertainty in our understanding of carbon cycling and their impact on radiative forcing. The TCP, through the Global Tropospheric Experiment (GTE) program [http://www-gte.larc.nasa.gov/] has studied the distribution and the processes that control these trace gases. These datasets provide the input to satellite sensor retrieval algorithms, which allow the transfer of these in situ data to a global scale (e.g. CO on Terra and the Aura investigations). Understanding the large-scale distribution of these gases will be done in coordination with the North American Carbon Program (NACP) [http://www.esig.ucar.edu/nacp/nacp.pdf]. Proposals for the improvement and/or intercomparison of existing instrumentation focused on the rapid response measurement of these gases from suborbital platforms are encouraged. Proposed instrument improvements that contribute to our understanding of the global distribution of the NACP critical species, observed from integrated surface-suborbital-satellite observations should be carefully documented. For a list of available suborbital platforms, see Appendix F.

(Response) What are the effects of regional pollution on the global atmosphere, and the effects of global chemical and climate changes on regional air quality?

The TCP supports satellite remote sensing in the study of the distribution of and the processes that control tropospheric ozone and its precursor hydrocarbons and nitrogen oxides. Recent GTE field missions have focused on Asia and the Western Pacific region. In 2004, TCP is considering the Intercontinental Chemical Transport Experiment – North America (INTEX-NA). An overview of the mission concept can be found in the INTEX-NA white paper [http://geo.arc.nasa.gov/sgg/singh/white_paper.pdf]. INTEX-NA will emphasize chemistry-climate coupling, especially in the context of the potential climate impact of the generation and transport of regional pollution to global scales.

Proposals are solicited for the analysis of existing field experiment data sets, improvement and/or intercomparison of existing instrumentation or the development of

new instrumentation focused on these chemistry-climate coupling objectives. Proposals that focus on the analysis of integrated satellite-suborbital data will be favored. Proposals for instrument development should document how the new capability can enhance NASA's ability to improve our knowledge of tropospheric chemistry and transport in the context of integrated suborbital and satellite studies. Instrumentation should be compatible with existing suborbital platforms and preference will be given to instruments that can operate on both existing and the new evolving suborbital platforms. Selection under this NRA is not a guarantee of selection under a future INTEX NRA or membership on the INTEX Science Team.

Proposals are also solicited for the improvement of existing instrumentation or the development of new suborbital platform instrumentation in support of the draft EOS AURA validation plan [http://aura.gsfc.nasa.gov/mission/validation.html]. AURA validation instrument proposals should specify for which AURA data products the validation capability will be enhanced and the anticipated improvement(s) in the retrieved values of the parameter of interest. The proposal should provide a clear link to the draft AURA validation plan and the relevant parts of the corresponding instrument algorithm theoretical basis document. For a list of available suborbital platforms, see Appendix F.

(Prediction)
(1) How can weather forecast duration and reliability be improved by new space-based observations, data assimilation and modeling?
(2) How well can transient climate variations be understood and predicted?
(3) How well can long-term climate trends be assessed or predicted?

In order to answer the above prediction questions, this NRA will fund research to understand and predict the behavior of the global earth system on three important time scales: weather, near-term climate variability and long-term climate change. Climate predictions rely heavily on General Circulation Models (GCMs) of the ocean and atmosphere with realistic representations of the coupling processes between land/ocean surfaces and the atmosphere.

This NRA will consider proposals that address model initialization strategy, data assimilation, model integration, model uncertainty reduction, and satellite and model data comparisons. Priority will be given to proposals that emphasize the connections to cloud and radiation processes and modeling of aerosol-cloud-radiation feedbacks.
Proposals that show connection or integration with the NASA's core modeling efforts at Data Assimilation Office (DAO) [http://dao.gsfc.nasa.gov/], NASA Seasonal-to-Interannual Prediction Project (NSIPP) [http://nsipp.gsfc.nasa.gov] and Goddard Institute for Space Studies (GISS) [http://www.giss.nasa.gov] are preferred.

ESE supports the Global Modeling Initiative (GMI) as an important assessment and model evaluation tool. GMI will be utilized to assess progress toward resolution of uncertainties among models. The GMI will also be utilized to compare global satellite data to model predictions. The satellite datasets provide the long term climatology of clouds and aerosols, for example, against which the GMI can be evaluated. In turn, the

GMI provides an important resource in the development of systematic model datasets, that serve as input to and evaluation of satellite sensor retrieval algorithms. The GMI model is a modular chemical-transport model (CTM) with the ability to carry out multiyear assessment simulations as well as incorporate different modules, such as meteorological fields, chemical mechanisms, aerosol mechanisms, numerical methods, and others representing the different approaches of current models. Some principal investigators funded under this NRA may be encouraged to provide to GMI a developed module, data set or analysis tool that can contribute to the overall assessment goal. Provision of a module carries with it the explicit expectation of oversight in integration of the module into the GMI framework, evaluation of module performance, and, where relevant, evaluation of the sensitivity of that module to other processes in the GMI configuration. Future performance of these activities, if needed for assessment purposes, will be funded by either a redirection or increment in the Principal Investigator's funding.

Proposals that require computational resources to be provided by NASA should provide detail on specific requirements and computing resources requested. This information will be included in proposal evaluation. Item 7 in Appendix A provides guidelines in using NASA provided facilities. Currently NASA provides high-end computing resources through Goddard Space Flight Center [http://webserv.gsfc.nasa.gov].

The total available funds for investigations solicited under this NRA are about $14M/year for a period of three years. Two categories of proposals are solicited: (1) proposals that address specific questions within a given research area; and (2) cross-cutting Interdisciplinary Science (IDS) proposals that are broader in scope, integrate across disciplines and combine modeling and data analysis from surface, in situ and/or satellites. Proposals in the first category may range up to $300K/year for three years with the norm of $100k to $150K/year. It is expected that a total of ~$8M/year may be available. In the second category, IDS, proposals may range up to $700K/year. It is expected that ~$6.0M/year for three years may be available. This NRA is supportive of the research objectives described above, as well as those of the Climate Variability and Predictability (CLIVAR) Program, World Climate Research Programme's Global Energy and Water Cycle Experiment (GEWEX) and the International Global Atmospheric Chemistry (IGAC) Program. Grants awarded during the previous IDS NRA (NRA-99-OES-04) seeking renewal in areas represented in this current NRA should submit proposals to this NRA.

In keeping with overall NASA goals and those of the Office of Earth Science, research supported by this NRA should include demonstration of successful use of data from satellite observing systems, in conjunction with other complimentary of data, to improve models and data assimilation for the Earth system or one or more of its components.

NASA is presently soliciting proposals for investigations that will contribute to addressing the questions indicated above. Proposals should also meet the requirements listed in Appendices A through E. Funding for this NRA is expected to be authorized and appropriated and NASA reserves the right to cancel this NRA in the event that

adequate funds are not authorized and appropriated by the U.S. Administration and Congress.

Participation is open to all categories of domestic and foreign organizations, including educational institutions, industry, non-profit institutions, NASA Centers, and other U.S. Agencies. In accordance with NASA Policy as described in Appendix A, all investigations by foreign participants will be conducted on a no-exchange-of-funds basis, i.e., investigators whose home institution is outside of the United States cannot be funded by NASA. Proposals may be submitted at any time during the period ending, December 12, 2002, 4:30 PM EDT. NASA reserves the optional right to consider proposals received after that date in accordance with Appendix A, i.e., "the selecting official deems the late proposal to offer significant technical advantage or cost reduction". Proposals will be submitted to a peer and/or Program Office review and evaluation. Selected proposals will be announced during February 2003.

NASA's policy is to work cooperatively with other U.S. government agencies and our international partners in the development of a comprehensive capability to observe and understand the Earth. In addition, both National and NASA policy require NASA to support private-sector investment in commercial space activities by committing the U.S. government to purchase commercially available goods and services. NASA will not develop a mission that in any significant way competes with or duplicates commercially available goods or services from U.S. industry.

Appendices A through E contain NASA general guidelines for the preparation of proposals solicited by this Research Announcement.

Appendix E provides guidelines for a Notice of Intent (NOI), which although not required is a specific request within this NRA. **Instrument operation, improvement or development proposals are strongly encouraged to include their suborbital platform preferences in their NOI.**

Identifier

NRA-02-OES- 06
Multidisciplinary Research In Climate, Chemistry, And Global Modeling

Submit proposals to:

NASA Peer Review Services
500 E Street SW, Suite 200
Washington, DC 20024, USA
Phone: 202-479-9030

Number of Copies Required: 20

Selecting Official:

Dr. Jack Kaye
Director, Research Division
Office of Earth Science
NASA Headquarters

Obtain Additional Information From:

Dr. Donald E. Anderson
Manager, Radiation Sciences Program
Code YS
NASA Headquarters
Washington, DC 20546
Phone: 202-358-1432
FAX: 202-358-2770
E-mail: danders1@hq.nasa.gov

Dr. Tsengdar J. Lee
Manager, Global Modeling and Analysis Program
Code YS
NASA Headquarters
Washington, DC 20546
Phone: 202-358-0860
FAX: 202-358-2770
E-mail: tlee@hq.nasa.gov

Dr. James F. Gleason
Manager, Tropospheric Chemistry Program
Code YS
NASA Headquarters
Washington, DC, 20546
Phone: 202-358-0743
FAX: 202-358-2770
E-mail: jgleason@hq.nasa.gov

Please use identifier number NRA-02-OES-06 when making an inquiry regarding this Announcement. Your interest and cooperation in participating in this opportunity are appreciated.

Proposals submitted to NASA Headquarters will cause a delay in receipt of your proposal, therefore, please adhere to "Submit proposals to" noted above.

ORIGINAL SIGNED BY

Ghassem R. Asrar
Associate Administrator
Office of Earth Science

APPENDIX A

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

NASA Federal Acquisition Regulation (FAR), Supplement (NFS) Part 1852.235-72 , Effective JANUARY 2000 (Modified)

(a) **General.**

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements that apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information that applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) **NRA-Specific Items**.

Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) **Transmittal Letter or Prefatory Material**.

(i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;
(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
(vi) Identification of the NRA, by number and title, to which the proposal is responding;
(vii) Dollar amount requested, desired starting date, and duration of project;
(viii) Date of submission; and
(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice
Restriction on Use and Disclosure of Proposal Information

The information (data) contained in *[insert page numbers or other identification]* of this proposal constitutes a trade secret and/or information that is commercial or

financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description**.

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach**. For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and - arrangements for ensuring a coordinated effort should be described.

(6) **Personnel**. The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment**.

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8**) Proposed Costs (U.S. Proposals Only).**

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(9) **Security**. Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support**. For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters**.

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals**.

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length**. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals**.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g**) Late Proposals**. Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(h) **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i) **Evaluation Factors**.

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j) **Evaluation Techniques**. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within

NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award**.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation**.

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA and, if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a

foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor; or

(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

(m) **Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation**.

(1) U.S. proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at http://www.pmdtc.org and http://www.bxa.doc.gov. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

(n) **Cancellation of NRA**.

(1) NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

(End of provision)

Appendix B

Required Proposal Cover Pages

Two proposal cover pages are required as part of the proposal. The first is a **hard copy** (see Appendix C) that must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. This authorizing signature also certifies that the proposing institution has read and is in compliance with the required certifications printed in full, therefore, these certifications do not need to be submitted separately. This page will not be counted against the page limit of the proposal.

The second proposal cover page (Appendix C) must be submitted **electronically** to the SYS-EYFUS Web site located at **http://proposals.hq.nasa.gov/**.

If the proposer obtained a User ID and password in the process of submitting a proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic proposal cover page in response to this research opportunity announcement. Be sure to click on "Edit Personal Information" if any of your correspondence information in the SYS-EYFUS is not current.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to *http://proposals.hq.nasa.gov* and performing the following steps:

- Click the hyperlink for **new user** which will take you to the Personal Information Search Page.
- Enter your first and last name. SYS-EYFUS will **search** for your record information in the SYS-EYFUS database.
- Confirm your personal information by **choosing** the record displayed.
- Select **continue**, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, **login** to the SYS-EYFUS Web site and follow the instructions for **New Proposal Cover Page.**

Proposers without access to the Web or who experience difficulty in using this site may contact the Help Desk at proposals@hq.nasa.gov (or call 202.479.9376) for assistance. After you have submitted your notice of intent or proposal cover page electronically, if you are unsure if it has been successfully submitted, do not re-submit. Please call the Help Desk. They will be able to promptly tell you if your submission has been received. Please note that submission of the electronic cover page does not satisfy the deadline for proposal submission.

Appendix C

Proposal Cover Page

Proposal Number: _____

Date: __/___/_____

Name of Submitting Institution: **Congressional District:**

Proposal Title:			
Name of Submitting Institution:		**Congressional Distinct:**	

Certification of Compliance with Applicable Executive Orders and US Code

By submitting the proposal identified in this *Cover Sheet/Proposal Summary* in response to this Research Announcement, the Authorizing Official of the proposing institution (or the individual proposer if there is no proposing institution) as identified below:

- certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- confirms compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this NRA [namely, (i*) Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs, and (ii) Certifications, Disclosures, And Assurances Regarding Lobbying and Debarment & Suspension*].

Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

NASA PROCEDURE FOR HANDLING PROPOSALS

This proposal shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this proposal shall also be strictly complied with. Disclosure of this proposal for any reason outside the Government evaluation purposes shall be made only to the extent authorized by the Government.

Principal Investigator Name:		Authorized Institutional Official Name:	
Organization:		Organization:	
Department:		Department:	
Mailing Address:		Mailing Address:	
City, State Zip:		City, State Zip:	
Telephone Number:		Telephone Number:	
Fax Number:		Fax Number:	
Email Address:		Email Address:	
Principal Investigator Signature:	_____	Authorized Institutional Official Signature:	_____
Date:	_____	Date:	_____

Co-Investigator:

Name	Telephone	Email	Institution	Address

Budget:

Year	
1	
2	
3	
Total	

Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The *(Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant ")* hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1972 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which it retains ownership or posession of the property. In all other cases, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear on the Proposal Cover Sheet above are authorized to sign on behalf of the Applicant.

CERTIFICATIONS, DISCLOSURES, AND ASSURANCES
REGARDING LOBBYING AND DEBARMENT & SUSPENSION

1. LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 14 CFR Part 1271, as defined at 14 CFR Subparts 1271.110 and 1260.117, with each submission that initiates agency consideration of such applicant for award of a Federal contract, grant, or cooperative agreement exceeding $ 100,000, the applicant must **certify** that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit a Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. GOVERNMENTWIDE DEBARMENT AND SUSPENSION

As required by Executive Order 12549, and implemented at 14 CFR 1260.510, for prospective participants in primary covered transactions, as defined at 14 CFR Subparts 1265.510 and 1260.117—

(1) The prospective primary participant **certifies** to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (l)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

APPENDIX D

BUDGET SUMMARY

For period from _____ to _____

- Provide a complete Budget Summary for year one and separate estimated for each subsequent year.
- Enter the proposed estimated costs in Column A (Columns B & C for NASA use only).
- Provide as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions For Budget Summary* on following page for details.

		| NASA USE ONLY |	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	_____	_____	_____
2. Other Direct Costs:			
a. Subcontracts	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. Indirect Costs*	_____	_____	_____
4. Other Applicable Costs	_____	_____	_____
5. SUBTOTAL--Estimated Costs	_____	_____	_____
6. Less Proposed Cost Sharing (if any)	_____	_____	_____
7. Carryover Funds (if any)			
a. Anticipated amount : _____			
b. Amount used to reduce budget	_____	_____	_____
8. Total Estimated Costs	_____	_____	XXXXXXX
9. APPROVED BUDGET	XXXXXX	XXXXXXX	_____

***Facilities and Administrative Costs.**

INSTRUCTIONS FOR BUDGET SUMMARY

1. Direct Labor (salaries, wages, and fringe benefits): Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.
2. Other Direct Costs:
   a. Subcontracts: Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
   b. Consultants: Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs).
   c. Equipment: List separately. Explain the need for items costing more than $5,000. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds.
   d. Supplies: Provide general categories of needed supplies, the method of acquisition, and the estimated cost.
   e. Travel: Describe the purpose of the proposed travel in relation to the grant and provide the basis of estimate, including information on destination and number of travelers where known.
   f. Other: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.
3. Indirect Costs*: Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.
4. Other Applicable Costs: Enter total explaining the need for each item.
5. Subtotal-Estimated Costs: Enter the sum of items 1 through 4.
6. Less Proposed Cost Sharing (if any): Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.
7. Carryover Funds (if any): Enter the dollar amount of any funds expected to be available for carryover from the prior budget period Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget (not applicable to 2nd-year and subsequent-year budgets submitted for award of a multiple year award).
8. Total Estimated Costs: Enter the total after subtracting items 6 and 7b from item 5.

* Facilities and Administrative (F&A) Costs

Appendix E

Notice of Intent to Propose

In order to plan for a timely and efficient peer review process, *Notices of Intent* (NOI's) to propose are strongly encouraged by the date given in this NRA. **Instrument operation, improvement or development proposals are strongly encouraged to include their suborbital platform preferences in their NOI**. The submission of a NOI is not a commitment to submit a proposal, nor is information contained therein considered binding on the submitter. NOI's are to be submitted electronically by entering the requested information through SYS-EYFUS Web site located at **http://proposals.hq.nasa.gov/**.

User identifications (IDs) and passwords are required by NASA security policies in order to access the SYS-EYFUS Web site.

If the proposer obtained a User ID and password in the process of submitting a proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic Notice of Intent to Propose in response to this research opportunity announcement.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to *http://proposals.hq.nasa.gov* and performing the following steps:

- Click the hyperlink for **new user** which will take you to the Personal Information Search Page.
- Enter your first and last name. SYS-EYFUS will **search** for your record information in the SYS-EYFUS database.
- Confirm your personal information by **choosing** the record displayed.
- Select **continue**, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, **login** to the SYS-EYFUS Web site and follow the instructions for **New Notice of Intent.**

At a minimum, the following information will be requested:

- NRA number, alpha-numeric identifier, (Note: this may be included on the Web site template);
- the Principal Investigator's name, mailing address, phone number, and E-mail address;
- the name(s) of any Co-Investigator(s) and institution(s) known by the NOI due date;
- a descriptive title of the intended investigation; and,
- a brief description of the investigation to be proposed.

A separate NOI must be submitted for each intended proposal.

Appendix F

ESE Suborbital Platform Assets

ESE suborbital platform assets currently consist of a core fleet of 4 NASA aircraft, supplemented by a variety of experimental, interagency and commercial platforms. The list below represents those platforms for which agreements or procurement vehicles for access by ESE investigators are in place or in work, or have recently been approved by NASA Aviation Management as airworthy and safely operated. The list should not be considered all-inclusive, but any platform proposed must comply with NASA aviation safety policies, including the Non-NASA Aircraft Safety Policy.

Performance, cost and schedule information for the platforms below is available from the web-sites referenced. If the web-sites do not provide adequate information, the NASA/ESE Suborbital Science Program staff will assist proposers in obtaining more information. Please email cyuhas@hq.nasa.gov for suborbital platform assistance.

Core Platforms

ER-2 http://www.dfrc.nasa.gov/airsci/
DC-8 http://www.dfrc.nasa.gov/airsci/
P3-B http://www.wff.nasa.gov/~apb/

Experimental Platforms available for lease/rent

Pathfinder + UAV http://www.dfrc.nasa.gov/airsci/
Altair UAV (after 2003) http://www.dfrc.nasa.gov/airsci/
Scaled Composites, Inc. Proteus http://www.dfrc.nasa.gov/airsci/
Aerosonde UAV http://www.aerosonde.com/ or http://www.wff.nasa.gov/~apb/
Altus UAV http://www.dfrc.nasa.gov/airsci/
Northrup-Grumman GlobalHawk (after 2004) http://www.dfrc.nasa.gov/airsci/

Part-time or Cooperative NASA Platforms suitable for Earth Science

WB-57F http://jsc-aircraft-ops.jsc.nasa.gov/wb57/index.html
Learjet http://www.grc.nasa.gov/WWW/PAO/html/learjet.htm
OV-10 http://www-sdb.larc.nasa.gov/Air_Support/ov/now.html

Part-time or Cooperative Federal non-NASA Platforms

NSF C130, HIAPER (after 2005) http://raf.atd.ucar.edu/index.html
NRL P-3 http://www.nrl.navy.mil/
NOAA P-3, G-IV, Twin Otter, Citation, etc. http://www.omao.noaa.gov/ or http://www.hurricanehunters.noaa.gov/
DOE B200 jmyers@mail.arc.nasa.gov
ONR/NPS CIRPAS Twin Otter, Altus, Predator UAV http://web.nps.navy.mil/~cirpas/

University or Industry Platforms on cooperative, rental or leased basis

UND Citation http://www.aero.und.edu/ats/citation.htm
Twin Otter International, Inc. Twin Otter http://www.vistaliner.com/index.htm

KennBorek Twin Otter http://www.borekair.com/
SKYResearch Cessna Caravan http://skyresearchinc.com/
Keystone Aerial Surveys, Inc. Cessna Conquest http://www.keystoneaerialsurveys.com/
Horizons, Inc. AeroCommander http://www.horizonsinc.com/home.html
Aero-Metric, Inc. Cessna Conquest http://www.aerometric.com/

General information about the ESE Suborbital Science Program is available from the following web-site:
http://www.earth.nasa.gov/science/suborbital/